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ABSTRACT

"Teleinstruction" is used here to convey the concept of the use of equipment, processes, and procedures which provide instruction or the stimulation of learning at a distance from the original source of the stimulus materials. The author also defines the multi-media approach to learning and discusses ways in which the multi-media approach may be of aid in individualizing instruction. He discusses learner adaptations and identifies some of the patterns of use of teleinstruction. In addition to demonstrating the flexibility promised by the developing use of available media, the author discusses the problems of the future--providing optimum pacing for each student and developing multi-versions of instructional materials. (JY)

TELEINSTRUCTION AND INDIVIDUALIZED LEARNING

C. R. Carpenter*

APPROACHES TO THE SUBJECT

The purpose of this paper is to contribute to the tasks of clarifying and extending design strategies and practices for effectively using available and emerging telecommunication technologies for instigating the formal learning of college students.

The new cryptic term, teleinstruction, conveys the concept of the use of equipment, processes and procedures which provide instruction or the stimulation of learning at a distance from the original source of the stimulus materials. The operations can be simultaneous or sequential and involve recordings and time schedules.

THE MULTI-MEDIA APPROACH

Closed-circuit television (CCTV) is only one type of a very wide array of equipment, apparatus, instrumentation and procedures for providing communications for the instruction of individuals at remote points. Radio and broadcast television, on-line and shared-time computer arrangements, dial access materials and telephones can be used for purposes of teleinstruction. This extended concept should make a useful contribution to this important seminar on Using Educational Media to Individualize Instruction and to the design and use of instructional systems.

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The problem that confronts us, and which we shall attempt to resolve, is to show how the so-called "mass media" and other associated and complemental technologies can be used in new patterns and varied configurations to provide some of the required conditions for formal instruction and the educational development of college students.

Rapidly advancing thinking holds that the designing of optimum conditions and general systems of information for learning by students in colleges and universities requires the use of planned and tested combinations of media. The correct instructional uses of closed-circuit television, for example, currently may require books and periodicals, audio communication, tutorials, seminars and direct lectures, laboratory "experiments" and field experiences. This list does not exhaust the possible means and methods that may be needed for designing the complex requirements for optimally stimulating academic learning.

The multi-media system of instruction is widely accepted, and wise knowledgeable people have long since ceased to display the pathological syndrome of single medium fixation which was so characteristic of educational media innovators of the 1940's, 1950's and the early 1960's. Nevertheless there are still at this late hour fashions of media. The current one can probably be labeled "computer aided instruction" (CAI). Programed instruction and teaching machines was CAI's immediate predecessor and closed-circuit and broadcast television were previous fashions. We are becoming rapidly more perceptive than formerly about media fads and fashions, and we calmly understand that as each medium is proposed as the solution to learning strategies that "this, too, shall pass away."

REDEFINITION OF THE PROBLEM

There is an advance also of conceptual thinking about the media. They are carriers of information. They are empty channels and raw tapes, films and paper. The basic complex problem is to select the most appropriate modes of communication for learning strategies and put these into combinations. What kinds and proportions of modes are most effective for insuring specified learning results and performance changes for specified content units and for learners with known characteristics? When and where do we use print, spoken language (directly or recorded), graphic modes of communications, animation, art forms, and photography (both still and motion)? What kinds of print and in what formats best fit the requirements for optimizing the learning conditions? The same question can be asked about the other modes of communication. How do we use combinations of these modes in both simultaneous or sequential configurations? For what reasons or learning objectives should different modes and combinations of modes be used to provide high quality instruction? When do different modes summate, extend learning, increase generalization and when do different modes produce interference with learning?

When we become more specific in the task of design strategies, the problem becomes that of selecting modes and mode configurations which summate, reinforce and strengthen the stimulus impact on students and which shape their conceptual skills and intellectual competencies. Those media and modes should be selected and used to broaden and vary stimulus conditions to enhance the interests of students, and, to increase

the possibilities for the retention and generalization of learned performances. It is most difficult to select mode combinations which do not have internal interferences or do not overload the neuro-sensory channels with information or exceed the optimum rate of stimulus presentations.

What are the relations of all of these questions to the problem of individualizing instruction?

This line of thinking points to some of the most fundamental problems of instructional communications, and indeed of the nature of knowledge, its origin and order, its growth and organization.

" Teleinstruction and individualized learning would seem to pose a dilemma, a clash of ideas and a conflict of concepts -- How can the media and modes of modern technology be appropriately employed in learning strategies?

" Education has many 'shrines where educators worship, and one of these modern shrines is individualized instruction. There is no inter-individual nerve net. Let us agree once and for all time that only individuals learn. Classes, groups, seminars, families, audiences and populations do not learn. Individuals alone learn, but most frequently they learn in classes, groups, seminars, families, audiences and populations. These groupings constitute important if not essential conditions which affect in many ways the learning of individuals.

" Furthermore, it should be observed that there are factors in social conditions that affect learning positively by reinforcing the

learning, and there are other factors that affect learning negatively by interfering with or inhibiting learning.

Surely individuals do talk audibly or subvocally with themselves to good effect; they think, solve problems, test for better words or phrases, imagine new concept structures, create art objects and dream about the future. Surely, too, individuals do listen to others and learn; they engage in intensive and revealing dialogues, contend in debate and try their wings of logic in disputations. They observe models of intellectual performances and reject them or emulate them. In brief, learning is individualized and socialized. Only individuals learn but social factors provide positive and negative conditions which importantly affect the kind and rate of learning.

There are four practical guidelines that may be useful in the planning and execution of learning strategies.

First, design and provide varied and balanced patterns of conditions for learning. Vary sizes and composition of learning groups. Vary schedules. Balance study in splendid isolation for depth with discussions in groups for brightness and interest.

Second, design and provide conditions for learning which are like or which simulate the future conditions under which the individuals under consideration will continue to learn during their whole life cycle. There is, pertinent to our topic of teleinstruction, little prospect that the radio, the telephone, television, and motion picture

films will disappear as sources of information, instruction and entertainment.

Third, whatever the conditions of learning and learning technology, students need training in the strategies and skills for learning under the special conditions arranged or provided for formal learning. This proposition applies especially to individualizing learning and to planning for students to study independently.

Fourth, students should be taught in ways which lead them to become autonomous learners who are weaned both from their parents and teachers. The autonomous learner is freed from school requirements and restraints. He sets his own learning tasks, selects his own materials and methods, he achieves his own goals and reaps his own rewards.

With these approaches now made explicit, let us turn directly to the question of how to use teleinstruction media and how at the same time to individualize optimally the learning conditions. The question could be stated to read: How to individualize learning optimally while using teleinstructional principles, means, and methods.

Let us be very clear about the kinds of equipment, methods and content or messages that we are discussing and from which we can select patterns and combinations. The roll call is as follows: printed materials; recordings on film or tape, both audio and video; live transmissions ranging from telephone lines to multi-channel cables and on-line computers to laser beams; and broadcast diffusions ranging

from radio to continent-spanning communication satellites. It is proposed, furthermore, that many patterns of these phenotypically different but functionally similar media can be used to solve the design problems of maximizing the efficacy of instruction for learning. The design may include the special case of precisely adapted instruction for individualized learning."

ANALYSIS OF THE PROBLEM OF INDIVIDUALIZATION OF LEARNING

Essentially the general problem is to arrange for and adapt mediated instruction and conditions of media-mode uses to accommodate within the tolerance limits of individual differences which are essential and integral to learning. We are not to be concerned here with individual differences which are not highly contingent to learning operations. We are especially concerned with those adaptations and sets of conditions which affect learning to a degree of practical significance as well as statistical significance.

Ideally and theoretically we should include the settings or conditions for learning as well as the displays of materials for learning whether mediated by a teacher or through technologies. Individual requirements for learning are not unlimited. Tolerance limits can be found, it is assumed, and levels of difficulty, pacing rates and progression rates can be adjusted within these limits.

MANAGING INSTRUCTION

In addition to individual differences of students, there are other major components of the problem of individualized learning.

Some of these are the following:

1. Arranging for optimized interactions of instructional materials with the personalized goals, values, interests and activated motives of students.
2. Determining the general and specific educational competency levels of students and adjusting the levels of possible interactions with the right kinds and levels of instructional materials and methods.
3. Designing and arranging the places where learning interactions are to occur between students and the stimulus materials, students and teachers and students with students.
4. Scheduling, programing and pacing the patterns of interactions with the selected and designed instructional materials.
5. Programing the gradual transition from external control to self-regulated learning activities.

The regulation of interactions over time involves two main operations; scheduling or programing and timing or pacing. Programing a student through a curriculum or course is a gross operation extending over years, months, days and hours. Pacing is the rate at which an individual processes information provided by the instruction; the rate of perceiving, speed of reading, the rates of learning and understanding stimulus materials are processes that are included in pacing or fine timing. Pacing requires fine timing which may have an optimum rate

range extending from micro seconds for some kinds of foreign language learning, which involves matching and modeling phrases and sentences, to minutes for some kinds of problem solving or the mastery of complex concepts. Furthermore, scheduling like pacing can be self-regulated or externally controlled.

LEARNER ADAPTATIONS

The designing of instructional strategies includes another problem; namely, apportioning the kinds and amounts of adaptation demands or requirements between the instructional materials and associated media on the one hand and the student on the other hand. Effective instruction involves, among many other things, making appropriate and increasing demands on the student for increasing efforts to learn. When this is done, the student has many options of his own for accommodating to these demands. He can accept, reject or accommodate to them. Involved here are many styles of gamesmanship that is both understood and misunderstood by teachers and students. Students are not merely response mechanisms; they are persons who take action.

There is a problem here that we believe we discovered at Penn State. We had been mystified over and over again by the finding that regardless of the attempts to improve the instruction of courses, at least by greatly increasing the instructional energy input and by the elaboration of instructional materials and methods, grades and test scores remained relatively constant. The results were reflected both in measurements of means and variances.

A condition that prevailed in our experiments was that we usually attempted to develop only one, and never more than two, of the four or five semester courses of the student full course load.

It is known that students establish for themselves levels of performance expectancies, and these same expectancies are established for grades. Serious students also differentiate grade level expectancies for different courses in relation to their importance to him. It is more important for students to achieve good grades, for example, in their majors than in their elective courses.

There is an additional set of factors which seems to be operating. Poor instruction may be compensated for by good learning. A condition for this to occur is strong interest on the part of students for a subject.

Now we are ready for the paradox and hypothesis: when instruction is importantly improved in one of a set of courses and learning is made easier for the student, the demands on the student are reduced in that course and the grade level expectancy can be achieved with less effort, then the student channels his energies into the other courses of his total program, consequently grades and test measures in the improved experimental course remain as they were before the course was developed.

The most important conclusion that can be formulated, assuming that the hypothesis is correct, is that good experimentation in an operational educational context requires that the total demand system which operates on students be brought under control or included in the experimental design strategies.

It is interesting to observe that our definition of an adequate sampling of content has changed from lesson or instructional units in 1948 to full courses in 1958 and now the entire work load of students in 1968!

PATTERNS OF USE OF TELEINSTRUCTION

The patterns of use of telecommunications equipment and technology for instruction in colleges and universities is only part of the full strategies of instruction. From 1954 to 1964 we planned, developed, used and generally evaluated about twenty-five permutations and variations of patterns of use of telecommunications.

These studies have been reported in four major reports and a sound motion picture.* I propose to review some of the main developments and suggest how some of these patterns can be used to accommodate to the goals and interests of students and their individual differences and also used to provide flexibility of instruction. Other patterns of use require adaptations that students themselves can make. There are patterns of production and patterns of use that cannot be recommended. There are those that remain to be developed, perfected and accepted by educators.

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*First closed-circuit TV report, The Pennsylvania State University. Carpenter, C.R., Greenhill, L.P. Project Number One: An Investigation of Closed-Circuit Television for Teaching University Courses, July 1955. Carpenter, C.R., Greenhill, L.P. An Investigation of Closed-Circuit Television for Teaching University Courses, Report Number Two. Carpenter, C.R., Greenhill, L.P. Comparative Research on Methods and Media for Presenting Programed Courses in Mathematics and English. USOE, Instructional TV at The Pennsylvania State University: 1954-1963. A documentary sound film 38 min. 16mm.

Initially we used the basic and primitive method of originating instruction from a large classroom with fixed cameras connected by means of cable to a series of small and moderate-sized classrooms. The instructors lectured, performed demonstrations, asked and answered questions and otherwise conducted the class as they would have done before the introduction of television. The television equipment and operating personnel were intentionally made inconspicuous and unobtrusive.

This basic feasibility study that was done for the Fund for the Advancement of Education provided comparisons between (1) direct instruction in a class of several hundred students with fixed cameras with (2) transmitted and cathod-tube displayed instruction in classes ranging in size from about 35 to 60 students.

The classes with television receivers were monitored first by faculty members, then by graduate students and later by undergraduate proctors. Finally monitoring in classrooms was reduced in most courses and discontinued entirely in some courses. We made every effort to encourage students to accept increasing amounts of responsibility for managing his own learning and other classroom behavior.

Otherwise there was no more or less individualization of learning for students than in traditional college courses of instruction even though the students were on TV[a/] cable length removed from the instructor. Here a teacherless classroom was a new learning condition for many students.

It was clear from these early experiments that the fields of perception and information displays were importantly selected by the

camera operations. Objects and processes were enlarged or magnified, and the view of the instructor and what he displayed, including blackboard work, was improved for students seated from the center to the back of large classrooms. Thus, demands in students to select and react to instructional elements may have been reduced while viewing conditions were improved. Interferences of the large classes were reduced in the classrooms with television receivers.

The next set of variations which we introduced was the renovation of a classroom and remodeling it to serve as a place where instruction could be originated. In this "origination room" or studio there were several variations which differed from the pattern just described. The instructor could have with him in the studio small groups of students who could give immediate reactions to his lecture or questions, or raise representative questions that might have been asked in larger sections or by students not in the origination room. Then the instructor could lecture in the studio without students but direct his instruction to the movable cameras and the camera operators. This pattern made it possible to have more and better instructional materials such as charts, titles and graphics, as a result of more space and manouverability of the television cameras. Later when slide and film chains were added to our equipment these media could be used also by the instructor.

On the reception side we used a wide range of classroom sizes and solved many problems of arrangements of television receivers and speakers in classrooms that were not designed for the uses of 'new' media.

The objective was to have good viewing and listening conditions in all of the varied classrooms. Television was used as a justification for renovating old classrooms.

It was in developing a third set of conditions of learning that we gave the most attention to providing for adaptations and variations of conditions for student learning. The first step was to determine that the whole course of instruction need not be channeled over television and that the academic time-credit accounting system could and should be changed. Scheduling of segments of some courses was changed to provide time for lectures, both straight verbal and illustrated, lecture-demonstrations, proctor-led discussions, practicum sessions (e.g., in accounting), and regular and special laboratory work in sciences. In addition, of course, there were the regular assignments of text materials; reference sources, library work and other study. What we began to realize at this stage was that closed-circuit television could be made flexible and varied across courses and curriculums and within a course of study.

Flexibility and variations of instructional technology, methods and even goals and levels of attainment are very important even if they are not ideal conditions for individualized learning.

The instructors in originating studios without students expressed the need for means of talking with students. Realizing the problem of passivity of television viewing and the need for active responses and "feedback" to the instructors, we developed the "Telequest" means for studio--classroom and classroom--studio intercommunication.

With the "Telequest" sub-system, either the instructor or a student in any of the classrooms, and there could be 14 of these, could initiate a question. The question or comment could be heard by students in all 14 interconnected classrooms. Then, there could follow a discussion between the instructor and an individual student or several students in any of the classrooms.

The "Telequest" arrangement provided a means for the instructor to query individual students, and thus to introduce an element into his instruction which increased the alertness of students in television classrooms. This had a beneficial effect on class attendance even when rolls were not checked.

Some instructors provided times when students could see them but students themselves infrequently used these periods set aside for them. This problem raises a cluster of questions about how "feedback" on learning can be provided and used to improve instruction and the conditions for student learning.

Stephens College has very successfully adapted the telephone for mediating the "Telelecture." We tested this method for reaching out long distances for information that is current and for outstanding people who could not have been otherwise brought to students in formal class instruction. Thus, two/further developments followed.

The closed-circuit television and "Telequest" systems were interconnected with the telephone systems so that up to 400 or 500 students located in 14 classrooms could listen to conversations and discussions by leaders in relevant fields and by specialists in subjects

of interest. Students on signals could query the guest telelecturer. Conference telephone arrangements made available to students in a course in economics the opportunity to hear management and labor leaders at a state capitol in a strike situation and in a legislative debate on proposals for new labor laws. In political science, leaders of contesting parties were invited into the closed-circuit course by means of telelecture discussions.

The second major development during the early stages of experimentation was on the distribution side of the television operation. We reasoned that if it were practical to transmit instruction from one campus building to another then why not reach out to the expanding number of Commonwealth campuses. This we did as a test case by installing a micro-wave link between University Park and the Altoona campus.

In the pre-videotape era we also experimented with kinescopic recordings of instruction. We undertook to produce two core-of-course sets of instruction for the Air Force. We helped the DageBell Company perfect an inexpensive kinescopic recorder and used a strategy that opens up television instruction to many and varied patterns of use and flexibility for individualized learning or study in small groups. The strategy is that of recording the central and most important parts of courses, those parts that are appropriate for the medium, and those that have the "longest help-life" or slowest rate of antiquation, along with the greatest consensus of experts about both the content and methods.

The recorded core-of-course development provides flexibility of scheduling and actually requires planned supplementary work on the

parts of students and teachers in the learning situations.

The effects of these developments can be to provide specified places and roles for both students and teachers. Thus, the displacement effects of the televised "master teacher" can be greatly reduced or perhaps entirely eliminated.

The next development which became possible by linkage with Channel 10 Altoona was to simultaneously broadcast courses of instruction while the same instruction was being given to formally organized classes at University Park and at the Altoona campus. Here we challenged the course-credit-fee structure of higher education. Courses in philosophy, sociology, economics, history and meteorology were distributed by both closed-circuit arrangements and by broadcast methods.

We determined by a well-conducted telephone survey of population of people of the broadcast area that about 35,000 people viewed and listened fairly regularly to the course in sociology. However, less than 25 persons were interested in credit for the course. Most of the 35,000 were individual viewers. Thus, we opened up the formal classrooms of the University and invited the public to see and learn what transpires at the very heart of the University's instructional program. Sensitive administrators viewed as delicate public relations issues instruction in such subjects as comparisons of religious, political issues, comparative economic systems, and instruction of the physiology of reproduction. Actually there was less than one tenth of one percent of negative comments. The economics professor received almost a thousand letters of appreciation.

Agreements were proposed to the colleges of the broadcast area that they use the teleinstruction without cost during the experiment and keep records of the results. There were few professors who would accept instruction originated by another in another university. This reaction deserves further discussion and constitutes one of the main barriers to the development of levels of utilization that justify the costs of producing high quality programs of instruction.

What did this development show? That we could move instruction of some kinds to people rather than transport people to already crowded campuses. They showed that a very small percentage of an adult population is interested in courses for credit. Finally, it was shown that it is difficult to share or exchange instruction among institutions.

There is much to be done and much promise in instructional broadcasting that can lead to individualized learning. Neither management strategies for instructional broadcasts nor those for use in homes have been as fully developed as they might be. There are needs for an instrument development in the home which will do the following: provide the means for informing viewers immediately of the correctness or incorrectness of their responses to questions, problems and issues; make permanent records of the learners' responses which can be transmitted to the origination of the instruction; make on pre-scheduled timing a record of a unit of instruction that can be studied when this is best and most practical for the learner.

In addition, there need to be developments in producing and testing printed materials for coordinated study with televised instruction.

There are no real technical barriers to the use of telephones for feedback from home-viewed instruction to points of origination. And finally, the Albany Medical School has made successful demonstrations of two-way radio, which could also involve television components. Radio and television can be harnessed together.

We at Penn State demonstrated two other adaptations of televised instruction before attempting to apply programing procedures to courses for use over the media. First, we developed a variation of the Pyramid Plan for use with large television-instructed sections in sociology. This involved the organization of several hundred students in a closed-circuit television course into small groups of 12-15 individuals. The group discussions were led by selected and coached undergraduate students. The focus of the group's dialogues was on the issues and problems raised by the professor over television and on those that were of interest to students themselves.

The other adaptation of television during this phase was to install receivers in dormitories. This method of use was at a later date tested thoroughly at the University of Illinois and found to be acceptable. The next step, obviously, is to provide television sets for student dormitory rooms which make some of the best carrel spaces available on university campuses. Further advances in dormitory design using individual rooms in the same manner as is now done in modern hospitals, will make it possible to individualize learning by having in the living-study room arrays of equipment which include sound systems, small television receivers and dial access capabilities for

sound tape and film clips. In the building but not in the individual rooms, there could be on-line terminals for accesses to Computer Regulated Instruction (CRI).

In summary, we have in this section traced one exploratory development of teleinstruction, and thus we have described how technology has progressively become more varied and flexible, and therefore, more useful in individualizing instruction. By developing patterns of distribution of instruction over space, by scheduling and time-sequencing, by creating new patterns of course arrangements, the instruction has become more pliable and adaptable for both instructors and students. What remains is to deal with advances in providing pacing rates that are optimized for the differences in learning rates of individuals and to demonstrate how branching and differential leveling may be accomplished.

PACING RATES OF MEDIA

There is a pervasive belief in educational circles that pacing rates should be adjusted to each individual learner. When it is said that the student should be allowed to proceed at his own rate, two very different conditions may be involved: (1) the rate or schedule at which a student progresses through a course in terms of hours, weeks or months, and (2) the rate of learning which may include speeds of perceiving, reading, conceptualizing, choosing, solving problems and responding.

The independent study plan at Bucknell University releases the student from regular class attendance and permits him to regulate

his own rate of progression through the course. The more microscopic pacing rate is not controlled. The Bucknell condition provides, however, possibilities of great economies. The problem would seem to be that of preparing students for accepting the unusual responsibilities for managing their own study time. It should be observed that after instructional materials are prepared and made available the students may need to make little demand on their instructors for his time and help.

We at Penn State have conducted research and development work in an attempt to apply programing principles with the 'new' media, including closed-circuit television (CCTV). The critical problem to be solved was that of the rate of presentation and the rate of development of the instructional materials, lessons and courses. We solved this problem by determining the normal rate of work of samples of the target audience of students using preliminary versions of programed instruction in Algebra and Grammar. After these empirical tests pacing was adjusted to the several formats used in the project. Experiments were conducted with different pacing rates both slower and faster than the learner-based norms. Students adjusted their work rates to the controlled rates. There were no significant differences in test scores among the -80, -90, 100 +110 rates.

Two concepts resulted from these studies. First, it became doubtful whether or not the self-pacing rates of students are the optimum rates. Second, pacing that is slightly faster than an individual's

Results of the studies and analyses of pacing rates of instructional displays gave us confidence to proceed with programing materials for film strips, motion picture films, film loops and for closed-circuit television.

Programed instruction was originated 'live' in studios by especially planned mirror techniques, precisely paced on the basis of information collected from sample groups of students and distributed to classrooms where experimental groups randomly assigned, observed and responded to the frame by frame materials. Student responses were made on "response schedule sheets" which paralleled the televised instruction. Reinforcement was given in either the written or the verbal mode at a time estimated to be after students had made their responses. Thus administered, the test scores for students who were instructed over closed-circuit television were not significantly different from the scores made by students who were instructed by the programed book, film strip and teacher-presented versions of the course.

There was an incidental finding which relates to individualized instruction. It is generally known that some programed books may not maintain the interest and motivation of students. This was found to be true with the Penn State programed Grammar course. Student assistants and observers proctored the evening sessions, and the students complained about the lack of availability of instructors and the lack of appeal, or dullness, of the course material. Reacting to these opinions and attitudes, we paired students randomly and required each pair to use the same programed booklet, and to complete one answer sheet. The

pairs of students were asked to agree about the responses to frames or answers to problems and to accept the same unit test score. Complaints about the lack of attention from instructors ceased as did complaints about dullness of rather finely programed material.

It will be observed that programed courses administered by and-over media permitted the instruction of classes and multi-sectioned courses. Also, it is proposed that these feasibility demonstrations present the very real possibility that the procedures can be adapted and developed for uses with the broadcast media.

INDIVIDUALIZED INSTRUCTION BY MULTI-VERSIONS OF INSTRUCTIONAL MATERIALS

Instructional film research led to the development of production procedures for making multiple film versions. The experimental films differed with respect to defined variables either in the commentary and sound or in pictorial characteristics. All materials for the versions were "shot" or processed on a planned schedule and then edited together to meet the requirements of experimental designs.

This development demonstrated a means for producing instructional units for target audiences of trainees and students who differed in significant learning characteristics. Versions could be produced at low, medium and high levels of difficulty or in rates of context development. Thus, it was suggested that instructional film units could be adapted so as to be accommodated to limited ranges of individual differences.

An extension of this methodology involves the production and use of "single concept" films either 8mm. or 16mm. which presents,

usually in silent form, the core-of-a-unit or the core-of-a-course of instruction, and then provides varied opportunities for individualized adaptations to be made in the situations of use. This arrangement has the advantage at some levels of instruction of schools and colleges of providing for essential and defined roles for teachers and instructors. They are not as clearly displaced with core-of-unit or core-of-course materials as they are by full courses of media-presented instruction.

Dial access tapes and films are yet other adaptations of mediated instruction for different individuals. It should be observed that pacing rates are fixed in most dial access materials but that the rate of progression through a course of study, the selection of what units to study when and the amount of repetition and review are under the control and judgment of individual students.

In conclusion, the theme that has been developed is (1) that individualized instruction has both limitations and advantages, (2) that the varied characteristics of individualized instruction such as pacing rates and rates of progression through courses of study, or the levels of relative difficulty, need to be defined, and (3) that many adaptations can be made in media programs to provide new and significant means for Teleinstruction and Individualized Learning.